Attorney Docket
13641.0060

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

IN THE CLAIMS:

1. **(Currently amended)** A radio-frequency amplifier comprising:

a transistor having an input terminal, an output terminal, a control terminal, and a transconductance g_m;

a series-connected feed-through ~~resistance R_f and feed-through capacitance C_f~~ **impedance** connected in parallel with the input terminal and the output terminal of the transistor;

a load resistance R_L connected to the output terminal of the transistor; and

wherein the control terminal of the transistor is biased at a fixed voltage, **and the transistor and a signal source impedance r_s satisfy the equation:**

$$g_m = \frac{1}{r_s}\left(\frac{\delta\alpha}{\gamma}(1+\chi)^2\eta(\omega_o)+\eta^2(\omega_o)\right)^{-\frac{1}{2}}$$

where

δ = a gate noise coefficient of the transistor,

α = a ratio of g_m to a channel conductance at zero drain-to-source voltage of the transistor, g_{d0},

γ = a channel thermal noise coefficient of the transistor,

χ = a ratio of a backgate transconductance g_{mb} of the transistor to g_m,

ω_0 = an operation frequency, and

$\eta(\omega_0)$ = a ratio of a gate admittance g_g of the transistor to g_m.

2. **(Original)** The radio-frequency amplifier of claim 1 further comprising a tank circuit connected between a voltage source V_{dd} and the input terminal of the transistor.

3. **(Currently amended)** The radio-frequency amplifier of claim 1 ~~driven by a signal source with output impedance R_s,~~ wherein the transconductance g_m of the transistor is larger than [[$1/R_s$]] **$1/r_s$**.

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4. **(Currently amended)** The radio-frequency amplifier of claim 1 wherein the feed-through ~~resistance R_f~~ impedance is formed by a real resistor R_P in parallel with the transistor drain-source small-signal resistance r_{ds}.

5. **(Currently amended)** The radio-frequency amplifier of claim 3 wherein the feed-through ~~resistance R_f~~ impedance further comprises an inductance L_P.

Claim 6 (cancelled).

7. **(Currently amended)** The radio-frequency amplifier of claim [[1]] 2 wherein the tank circuit comprises a parallel combination of a resistance, a capacitance, and an inductance.

Claims 8-11 (cancelled).

12. **(Currently amended)** A radio-frequency amplifer comprising:
a common gate amplifier having an input and an output; and
a ~~resistive~~ feed-through circuit having a resistance R_f coupled in parallel with the ~~output of the~~ common gate amplifier, wherein the resistive feed-through circuit reduces output noise power, **and the common gate amplifier and a signal source impedance r_s satisfy the equation:**

$$g_m = \frac{1}{r_s}\left(\frac{\delta\alpha}{\lambda}(1+\chi)^2\eta(\omega_o)+\eta^2(\omega_o)\right)^{-\frac{1}{2}}$$

where

g_m = an amplifier transconductance,

δ = a gate noise coefficient of the amplifier,

α = a ratio of g_m to a channel conductance at zero drain-to-source voltage of the amplifier, g_{d0},

γ = a channel thermal noise coefficient of the amplifier,

χ = a ratio of a backgate transconductance g_{mb} of the amplifier to g_m,

ω_o = an operation frequency, and

$\eta(\omega_o)$ = a ratio of a gate admittance g_g of the amplifier to g_m.

13. **(Currently amended)** The radio-frequency amplifier of claim 12 wherein the ~~resistive~~ feed-through circuit further comprises an inductance L_P.

14. The radio-frequency amplifier of claim 12 wherein the ~~resistive~~ feed-through circuit comprises a feed-through resistance R_P and a feed-through capacitance C_P.

Claim 15 (cancelled).

16. (New) A radio-frequency amplifer comprising:

a common gate amplifier having an input and an output; and

common gate amplifier transconductance and feed-through means for reducing transistor noise that is passed on to the load

17. (New) The radio-frequency amplifier of claim 16 wherein the common gate amplifier transconductance and feed-through means satisfies the equation:

$$g_m = \frac{1}{r_s}\left(\frac{\delta\alpha}{\lambda}(1+\chi)^2\eta(\omega_o)+\eta^2(\omega_o)\right)^{-\frac{1}{2}}$$

where

g_m = an amplifier transconductance,

r_s = signal source impedance

δ = a gate noise coefficient of the amplifier,

α = a ratio of g_m to a channel conductance at zero drain-to-source voltage of the amplifier, g_{d0},

γ = a channel thermal noise coefficient of the amplifier,

χ = a ratio of a backgate transconductance g_{mb} of the amplifier to g_m,

ω_o = an operation frequency, and

$\eta(\omega_o)$ = a ratio of a gate admittance g_g of the amplifier to g_m.

18. (New) The radio-frequency amplifier of claim 16 comprising:

a first stage including the common gate amplifier transconductance and feed-through means;

a second stage coupled to the first stage including a common-source amplifier with inductive degeneration; and

a third stage coupled to the second stage including a common-source amplifier with inductive degeneration.

19. (New) The radio-frequency amplifier of claim 16 wherein the common gate amplifier transconductance and feed-through means further comprises a resistance R_f.

20. (New) The radio-frequency amplifier of claim 19 wherein the resistance R_f is formed by a resistance R_p in parallel with a transistor drain-source resistance r_{ds}.

21. (New) The radio-frequency amplifier of claim 16 wherein the common gate amplifier transconductance and feed-through means further comprises an inductance L_p.

22. (New) The radio-frequency amplifier of claim 16 driven by a signal source with output impedance r_s, wherein a transconductance g_m of the radio-frequency amplifier is larger than $1/r_s$, a series-connected resistor R_f and capacitor C_f is connected between the input terminal and the output terminal of the radio-frequency amplifier, so that the real part of an input impedance of the radio-frequency amplifier is increased.

23. (New) The radio-frequency amplifier of claim 1 wherein oscillation is prevented by ensuring that the real part of an input port impedance Z_{in} and the real part of an output port impedance Z_{out} are positive, where $\mathrm{Re}[Z_{in}]$ and $\mathrm{Re}[Z_{out}]$ can be expressed as

$$\mathrm{Re}[Z_{in}] = \frac{R_f + \mathrm{Re}[Z_L]}{1 + g_m R_f (1+\chi)}$$
$$\mathrm{Re}[Z_{out}] = R_f + \left[g_m R_f (1+\chi) + 1\right]\mathrm{Re}[Z_S]$$

where

R_f = a feed-through resistance,

Z_S = a source impedance, and

Z_L = a load impedance.

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24. (New) The radio-frequency amplifier of claim 12 wherein oscillation is prevented by ensuring that the real part of an input port impedance Z_{in} and the real part of an output port impedance Z_{out} are positive, where Re[Z_{in}] and Re[Z_{out}] can be expressed as

$$\mathrm{Re}[Z_{in}] = \frac{R_f + \mathrm{Re}[Z_L]}{1 + g_m R_f (1+\chi)}$$
$$\mathrm{Re}[Z_{out}] = R_f + \left[g_m R_f (1+\chi) + 1\right]\mathrm{Re}[Z_S]$$

where

R_f	=	a feed-through resistance,
Z_S	=	a source impedance, and
Z_L	=	a load impedance.

25. (New) The radio-frequency amplifier of claim 16 wherein oscillation is prevented by ensuring that the real part of an input port impedance Z_{in} and the real part of an output port impedance Z_{out} are positive, where Re[Z_{in}] and Re[Z_{out}] can be expressed as

$$\mathrm{Re}[Z_{in}] = \frac{R_f + \mathrm{Re}[Z_L]}{1 + g_m R_f (1+\chi)}$$
$$\mathrm{Re}[Z_{out}] = R_f + \left[g_m R_f (1+\chi) + 1\right]\mathrm{Re}[Z_S]$$

where

g_m	=	an amplifier transconductance,
R_f	=	a feed-through resistance,
Z_S	=	a source impedance,
Z_L	=	a load impedance, and
χ	=	a ratio of a backgate transconductance g_{mb} of the amplifier to g_m.